

Original Article

Factors influencing psychological distress and effects of stepwise psychological care on quality of life in patients undergoing chemotherapy after breast cancer surgery

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Abstract: Objective: To investigate factors influencing psychological distress and the effect of stepwise psychological care on the quality of life in patients undergoing chemotherapy after breast cancer surgery. Methods: A retrospective study was conducted on 96 patients undergoing chemotherapy after breast cancer surgery. The patients were evenly divided into a routine care group (control group) and a stepwise psychological care group (observation group) according to the care method. The correlation between the psychological distress and the Self-Rating Anxiety Scale (SAS) score was investigated. The impact of care intervention on the psychological distress, SAS score, and the quality of life of patients before and after intervention were explored. Relevant factors that affect the psychological distress of patients undergoing chemotherapy after breast cancer surgery were also investigated. Results: A univariate analysis showed that age, residence, monthly income, education level, medical insurance status, occupation, surgery method, and anxiety score all contributed to the degree of psychological distress in patients with breast cancer mastectomy (all $P < 0.05$). A multivariate regression analysis demonstrated that young age, low monthly income, no medical insurance, mastectomy, and high SAS score were risk factors for the psychological distress of patients who underwent mastectomy (all $P < 0.05$). The psychological distress was positively correlated with anxiety scores of patients undergoing chemotherapy after breast cancer surgery ($r = 0.249$, $P = 0.005$). Both psychological distress and anxiety scores of the observation group after stepwise psychological care were significantly lower than those before treatment and those of the control group (both $P < 0.05$). After treatment, both groups of patients showed better scores in additional concerning items, social/family well-being, functional well-being, physical well-being, emotional well-being, and overall quality of life than before treatment (all $P < 0.05$). Of note, the observation group demonstrated better quality of life than that of the control group. Conclusion: Age, low monthly income, radical mastectomy, and no medical insurance prior to undergoing chemotherapy after breast cancer surgery are independent factors that affect psychological distress. The distress was positively correlated with anxiety. Thus, stepwise psychological care may alleviate patients' psychological distress and anxiety.

Keywords: Breast cancer, mastectomy, chemotherapy, psychological distress, stepwise psychological care, anxiety, influencing factors

Introduction

Breast cancer is one of the most common cancers in women. The morbidity of breast cancer is as high as 11.4%, resulting in a death rate of 6.7% [1-3]. Studies have shown that the incidence of breast cancer is increasing year by year including in younger women [4]. Currently, mastectomy is a conventional treatment method for prolonging the survival of breast cancer patients, and postoperative adjuvant chemotherapy is an important strategy to control the

disease progression and prevent postoperative relapse [5, 6]. A previous study reported that patients with cancer were under tremendous psychological stress, and long-term stress can easily lead to depression, anxiety, or even suicidal tendencies in patients [7]. As a secondary sex characteristic, changes in the shape of breasts caused by surgery have a psychological impact on patients [8]. Hair loss and adverse effects during postoperative chemotherapy also have an adverse effect on patients' mental health [9, 10]. The incidence of mental illness in

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breast cancer patients was reported to be 10%-20%, and the incidence was much higher in breast cancer patients with mastectomy [11]. Therefore, psychological problems of breast cancer patients are attracting more attention.

The distress thermometer (DT) is an evaluation and screening tool that reflects the degree of psychological distress of patients [12]. A study revealed that psychological distress was positively correlated with patients' anxiety [12]. Stepwise psychological care is a systematic psychological therapy that plays important roles in alleviating distress, regulating patients' emotions, and making patients adapt to clinical treatment [13]. The care model has been widely used among cancer patients in recent years. At present, studies have reported that the psychological distress of patients undergoing chemotherapy after breast cancer surgery is correlated with their age, non-breast-conserving surgery, and clinical stage. However, so far no research has been conducted to study the effect of stepwise care on the psychological distress of patients undergoing chemotherapy after breast cancer surgery [14]. This study aimed to investigate influencing factors of the psychological distress and explore the effect of stepwise psychological care on the psychological distress and anxiety of patients after breast cancer surgery.

Materials and methods

General information

A retrospective study was conducted on 96 patients undergoing breast cancer mastectomy in the breast surgery department of Affiliated Hospital of Guangdong Medical University from January 2018 to December 2020. Patients were divided into a routine care group (control group) and a stepwise psychological care group (observation group), with 48 patients in each group. The patients had an age of 26-72 years old and an average age of 48.6 ± 9.9 years old. All participants signed an informed consent form. This study was approved by the Ethics Committee of Affiliated Hospital of Guangdong Medical University.

Inclusion and exclusion criteria

Inclusion criteria: 1) Patients with breast cancer and TNM staging in accordance with Gui-

deline for Breast Cancer, Chinese Anti-Cancer Association (CACA) [15]. 2) Patients with an age above 18 years-old; 3) Patients who underwent radical mastectomy for breast cancer; 4) Patients who underwent chemotherapy after surgery. Exclusion criteria: 1) Patients with incomplete clinical data; 2) Patients with severe heart, liver, kidney and other diseases; 3) Patients with mental illness or cerebrovascular disease who cannot cooperate; 4) Patients with inconvenient follow-up; 5) Patients with other cancers.

Methods

Collection of general data and relevant information

First, general data of patients were collected in the form of questionnaires, including: the age of the patient, education level, residence, family monthly income, payment method, current marital status, tumor staging, etc.

Randomization of selected patients after the questionnaire survey

Routine care: 1) Patients underwent routine chemotherapy after the mastectomy, during which vital signs were checked three-times a day [16]. Any progression of the disease should be reported to the doctor in time; 2) It was assured that the ward was comfortable and tidy; 3) The diet should be carefully prepared according to the specific condition of individuals, avoiding spicy food; 4) Treatment guidance for the administration of chemotherapy drugs was introduced, including the dosage, time, and adverse effects that may occur.

Stepwise psychological care: On the basis of routine care, the observation group was given stepwise psychological care. The researchers collected and analyzed the clinical data and proposed a stepwise psychological care plan according to the psychological characteristics and the cause of disease for patients after breast cancer surgery. Based on the step, course, content, and strategy, the stepwise psychological care consisted of an observation period, guidance period, face-to-face instruction period, and professional intervention period. For the observation period, after admission, routine health education was given to help the patients better understand their ability of daily

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life and self-care. The patients' psychological anxiety or depression and psychological distress were observed. They were also informed to contact the doctor and nurse in time in case of any question in order to establish a harmonious nurse-patient relationship. For the guidance period, a WeChat group was established to give the patients instructions for 10-15 minutes every week after their discharge, to understand the needs of patients for out-of-hospital care, and find out major problems and concerns faced by patients. For example, hygiene of the surgical area, rest and exercise, and prevention of postoperative complications, were considered and strategies and plans were provided to solve these concerns. This reduced patients' anxiety to a large extent, as well as enhanced their abilities of cognition, judgment, choice making, and emotional understanding. For the face-to-face instruction period, the intervention followed the guidelines of US authoritative "Home Care Manual for Cancer", which included symptom knowledge and management methods. In this period, the nursing staff focused on practical skills and aimed to guide patients to perform functional exercises of the upper limbs on the surgical side in order to promote postoperative blood circulation and chemotherapy. This also helped patients to understand the precautions and to help them maintain a good mood and socialize. The intervention course lasted for 1 hour each time when patients revisited the hospital every week. For the professional intervention period, in case the psychological distress continued or was aggravated after the intervention, the mental health doctors were able to strengthen the intervention, in which one-to-one counseling was adopted to understand the patients' problems, capture important information, guide patients to have faith in chemotherapy and its efficacy, and talk about the concerns or problems during chemotherapy. If symptoms were severe, patients could be transferred to a psychiatrist for psychotherapy.

Outcome measures

(1) A univariate analysis and a multivariate logistic regression were conducted to analyze the related factors affecting the psychological distress of patients undergoing chemotherapy after breast cancer surgery.

(2) A correlation analysis was applied to study the correlation between the degree of psycho-

logical distress and SAS score before care intervention.

(3) The effects of care intervention on patients' psychological distress and SAS scores were investigated. The distress thermometer (DT) was used to measure patients' psychological distress level, with a scale of 0-10 (0: no distress and 10: extreme distress, where ≥ 4 indicated moderate to severe psychological distress, while < 4 indicated normal mood fluctuation). Patients' anxiety was evaluated by using Self-rating Anxiety Scale (SAS), which contained 20 items with 1-4 points per item [12]. The sum of scores indicated the degree of anxiety. (The cut-off value of SAS standard score was 50 points, in which 50-59 points were considered mild anxiety, 60-69 points were moderate anxiety, and 70 points or more were severe anxiety [8]).

(4) The quality of life was evaluated before and after treatment by the functional assessment of cancer therapy-breast (FACT-G) [8]. The FACT-G contains 5 domains and 36 items, including functional well-being (7 items), social/family well-being (7 items), physical well-being (7 items), emotional well-being (6 items) and additional concerning items (9 items). Each item was rated on a 5-point scale, and the points in each domain were added to get the total points. Higher points indicated a better quality of life.

Statistical methods

SPSS 17.0 statistical software was used to analyze the data. Continuous variables conforming to a normal distribution and homogeneity of variances were presented as mean \pm standard deviation ($\bar{x} \pm sd$), which were analyzed by independent sample t test between groups and paired sample t test for before and after comparison within groups. Multi-group comparisons were done by one-way analysis of variance (ANOVA) combined with Bonferroni post hoc test. The counted data was analyzed by Pearson Chi-square test. The bivariate correlation was analyzed by Pearson correlation coefficient. Logistic regression analysis was applied to screen for risk factors affecting the psychological distress of patients undergoing chemotherapy after breast cancer surgery. A univariate analysis was conducted to identify variables with between-group differences, and forward stepwise selection (Ward) was used for variable

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screening. The inclusion level was 0.05 and the exclusion level was 0.1. The odds ratio (OR) was used to represent the risk of increased psychological distress, and the difference was considered statistically significant when $P < 0.05$.

Results

Comparison of general information between the two groups of patients

There were no significant differences in terms of age, address, monthly income, education level, marital status, medical insurance status, tumor stage, occupation, surgery method, psychological distress, and anxiety score between the two groups of patients at the admission (all $P > 0.05$; **Table 1**).

Factors influencing psychological distress in patients undergoing chemotherapy after breast cancer surgery

The average score of psychological distress of patients undergoing chemotherapy after breast cancer surgery was 4.57 ± 1.81 . A univariate analysis of the psychological distress of these patients showed that age, residence, monthly income, education level, medical insurance status, occupation, surgery method, and anxiety score were all factors contributing to psychological distress (all $P < 0.05$; **Table 2**).

Multivariate logistic regression analysis of risk factors for psychological distress in patients undergoing chemotherapy after breast cancer surgery

A multivariate regression analysis demonstrated that age, monthly income, medical insurance status, surgery method, and SAS score were factors influencing the psychological distress of patients after breast cancer surgery (all $P < 0.05$), among which the OR value of age was less than 1, while OR values of monthly payment, medical insurance status, surgery method, and SAS score were all above 1. Young age, low monthly income, no medical insurance, mastectomy, and high SAS score were risk factors for psychological distress (**Tables 3, 4**).

Correlation between psychological distress and anxiety score

The anxiety score of patients undergoing chemotherapy after breast cancer surgery was 54.96 ± 9.61 , and the degree of psychological

distress was positively correlated with the anxiety score ($r = 0.249$, $P = 0.005$; **Figure 1**).

Comparison of the degree of psychological distress and anxiety scores between the two groups of patients after care intervention

The degree of psychological distress and anxiety scores of the observation group after treatment were significantly lower than those before treatment and significantly lower than those of the control group (all $P < 0.05$; **Table 5**).

Comparison of the quality of life between two groups of patients before and after treatment

Before treatment, there were no significant differences regarding additional items of concern, social/family well-being, functional well-being, physical well-being, emotional well-being, or overall quality of life between the two groups of patients (all $P > 0.05$). After treatment, both groups of patients demonstrated better scores in additional items of concern, social/family well-being, functional well-being, physical well-being, emotional well-being, and overall quality of life than those before treatment (all $P < 0.05$; **Table 6**). Of note, the observation group showed better quality of life scales than those of the control group.

Discussion

Breast cancer is the most common malignancy in women, of which the incidence is increasing year by year with a trend to affect younger women [15]. Surgery is an effective method for the treatment of breast cancer. Postoperative chemotherapy can effectively prevent recurrence and metastasis, so it can control progression and prolong the life of patients [18, 19]. After the mastectomy, due to the changes in breast shape and the occurrence of adverse effects after chemotherapy, there may be a negative impact on the psychology of patients. If the negative emotion cannot be well alleviated, this will easily cause psychological disorders in patients. Therefore, how to effectively resolve negative emotions and increase psychological endurance for patients undergoing chemotherapy after breast cancer surgery has become a new topic of clinical research [20, 21].

This study shows that breast cancer patients have a high degree of psychological distress,

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Table 1. General information in the two groups of patients

Category	Observation group (n=48)	Control group (n=48)	χ^2/t	P
Age (n)			0.168	0.919
18-40	12	11		
41-60	25	27		
>61	11	10		
Residence (n)			0.686	0.408
Urban	30	26		
Rural	18	22		
Monthly income (n)			0.188	0.665
≤5000 CNY	15	17		
>5000 CNY	33	31		
Education level (n)			0.784	0.853
Elementary school and below	11	12		
Middle and high school	19	15		
College	10	11		
College and above	8	10		
Marital status (n)			1.126	0.771
Unmarried	10	13		
Married	32	27		
Divorced	4	5		
Widowed	2	3		
Medical insurance status (n)			0.547	0.761
No insurance	10	13		
Medical insurance for employees or residents	32	30		
Commercial insurance	6	5		
Tumor stage (n)			0.858	0.651
I	6	4		
II	32	36		
III	10	8		
Occupation (n)			0.048	0.827
Yes	32	33		
No	16	15		
Surgery method (n)			0.194	0.660
Modified radical mastectomy	34	32		
Breast-conserving surgery or modified reconstruction	14	16		
Psychological distress (point)	4.61±1.86	4.49±1.79	0.322	0.748
SAS score (point)	54.25±9.54	55.27±10.35	0.502	0.617

Note: SAS: self-rating anxiety scale.

which is a combination of the psychological problems that may exist in cancer patients according to the National Cancer Institute of the United States, and is defined as cancer-related psychological distress [22]. In this study, BC patients who received chemotherapy after surgery were selected, since psychological problems were more prominent in the early

stage of disease diagnosis and treatment. Studies have found that the higher the degree of psychological distress, the more serious the psychological problems of the patients during the treatment of breast cancer, which makes them more likely to develop mental illness [23, 24]. There are many factors that affect the degree of psychological distress, and patients

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Table 2. Factors influencing psychological distress in patients undergoing chemotherapy after breast cancer surgery

Category	Case	Degree of psychological distress (point)	t/F	P
Age (Y)			8.504	<0.001
18-40	23	5.61±1.83		
41-60	52	4.54±1.81 ^a		
61	21	3.52±1.03 ^{aaa,b}		
Residence (n)			2.154	0.035
Urban	56	4.23±1.60		
Rural	40	5.05±1.99		
Monthly income (n)			2.419	0.018
≤5000 CNY	32	5.19±1.97		
>5000 CNY	64	4.27±1.65		
Education level (n)			6.928	<0.001
Elementary school and below	23	5.61±1.81		
Middle and high school	34	4.62±1.76 ^c		
College	21	4.20±1.94 ^c		
College and above	18	3.63±1.01 ^{ccc,d}		
Marital status (n)			0.343	0.567
Unmarried	23	4.65±1.82		
Married	59	4.58±1.76		
Divorced	9	4.49±1.92		
Widowed	5	4.54±1.78		
Medical insurance status (n)			6.459	0.002
No insurance	23	5.35±1.80		
Medical insurance for employees or residents	62	4.35±1.80 ^e		
Commercial insurance	11	4.18±1.47 ^e		
Tumor stage (n)			0.872	0.345
I	10	4.62±1.82		
II	68	4.56±1.67		
III	18	4.76±1.92		
Occupation (n)			2.660	0.009
Yes	65	4.21±1.60		
No	31	5.20±1.98		
Surgery method (n)			2.174	0.032
Modified radical mastectomy	66	5.12±1.85		
Breast-conserving surgery or modified reconstruction	30	4.26±1.67		
SAS score (point)			2.956	0.004
<50	32	4.53±1.74		
≥50	64	5.32±1.97		

Note: compared with 18-40 years old, ^aP<0.05, ^{aaa}P<0.001; compared with 41-60 years old, ^bP<0.05; compared with elementary school and below, ^cP<0.05, ^{ccc}P<0.001; compared with middle and high school, ^dP<0.05; compared with self-finance, ^eP<0.05. SAS: Self-rating Anxiety Scale.

with different diseases experience psychological distress in different ways [25, 26].

In this study, we analyzed factors affecting the psychological distress of breast cancer patients

and demonstrated that age, monthly income, surgery method, and medical insurance status were independent factors that impact the psychological distress of patients undergoing chemotherapy after breast cancer surgery. A study

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Table 3. Assignment table of independent variables of influencing factors on psychological distress in patients undergoing chemotherapy after breast cancer surgery

Factor	Independent variable	Value
Age (Y)	X1	≤60=1, >60=0
Residence	X2	rural=1, urban=0
Monthly income (CNY)	X4	≤5000=1, >5000=0
Education level	X5	high school and below =1, college and above =0
Medical insurance status	X6	self-finance =1, medical insurance or commercial insurance =0
Occupation	X7	yes =1, no =0
Surgery method	X8	modified radical mastectomy =1, breast-conserving surgery or modified reconstruction =0
SAS score (point)	X9	≥50=1, <50=0

Note: SAS: Self-rating Anxiety Scale.

Table 4. Multivariate logistic regression analysis of psychological distress in breast cancer patients undergoing chemotherapy

Factor	β	SE	Wald value	OR value (95% CI)	P
Age (Y)	1.819	0.802	6.632	0.157 (0.051-0.624)	0.025
Residence	0.813	0.815	1.063	2.269 (0.501-10.269)	0.312
Monthly income (CNY)	0.308	0.846	12.688	0.072 (0.036-0.239)	<0.001
Education level	1.242	0.732	2.732	3.258 (0.802-12.265)	0.129
Medical insurance status	1.852	0.736	5.696	5.109 (1.403-21.364)	0.036
Occupation	0.196	0.732	0.068	0.842 (0.196-3.539)	0.785
Surgery method	1.956	0.754	5.491	5.017 (1.398-19.254)	0.031
SAS score (point)	1.983	0.843	6.892	0.178 (0.079-0.689)	0.006

Note: SAS: Self-rating Anxiety Scale.

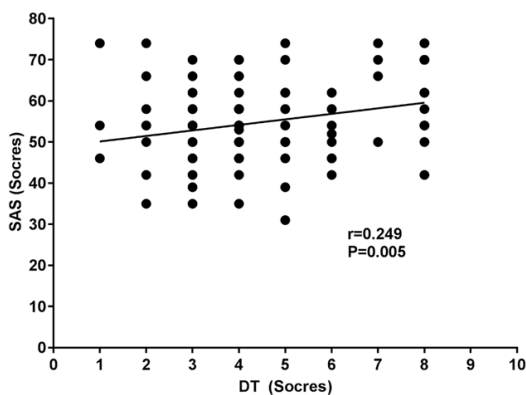


Figure 1. Study of correlation between psychological distress and anxiety score. SAS: Self-rating Anxiety Scale; DT: Distress Thermometer.

reported that young cancer patients were more prone to have anxiety, depression and suicidal tendency [27]. With age and life experience increasing, the psychological endurance of older patients is also higher than that of young

patients. A study revealed that the average age of the psychological distress group was 6 years younger than that of the distress-free group [28]. A previous study demonstrated that young patients with breast cancer were more affected by fatigue and distress due to the greater functional degeneration [29]. The monthly income and medical insurance status are problems encountered by patients in the course of treatment. Because the treatment cost is still a high, patients with low monthly income or without medical insurance are facing huge economic pressure, which undoubtedly have an impact on patients' psychology [30]. In terms of surgery methods, studies have shown that patients undergoing breast-conserving surgery have lower psychological distress than those undergoing radical mastectomy, which may be due to the psychological distress caused by weakened femininity, impaired sexual life, and depression after mastectomy [31]. Another study revealed that surgery options and adverse effects of

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Table 5. Degree of psychological distress and anxiety score in the two groups of patients after care intervention

Category	Observation group	Control group	t	P	Observation group	Control group	t	P
	Before treatment	Before treatment			After treatment	After treatment		
Degree of psychological distress (point)	4.61±1.86	4.49±1.79	0.322	0.748	3.26±1.52***	4.02±1.62	2.730	0.020
SAS score (point)	54.25±9.54	55.27±10.35	0.502	0.617	48.74±9.01***	53.78±10.21	2.564	0.012

Note: Compared to before treatment within the same group, ***P<0.001.

Table 6. Comparison of the quality of life between two groups of patients before and after treatment

Category	Observation group	Control group	t	P	Observation group	Control group	t	P
	Before treatment	Before treatment			After treatment	After treatment		
Additional concerning items	13.82±2.73	14.02±2.92	0.346	0.730	18.62±3.22*	15.92±3.72*	3.802	<0.001
Social/family well-being	11.27±2.65	11.87±2.78	1.082	0.282	17.21±3.52*	13.92±3.31*	4.717	<0.001
Functional well-being	12.82±2.78	13.23±2.68	0.736	0.484	16.23±2.83*	14.04±2.92*	3.731	<0.001
Physical well-being	13.72±2.48	13.82±2.61	0.192	0.848	17.62±3.21*	15.92±3.28*	2.566	0.012
Emotional well-being	12.23±2.57	12.63±2.61	0.767	0.451	17.26±3.35*	15.32±3.54*	2.578	0.007
Overall quality of life	63.92±7.92	64.23±7.62	0.195	0.845	86.19±12.92	75.09±11.72	4.409	<0.001

Note: Compared to before treatment within the same group, *P<0.005.

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chemotherapy can affect the psychological distress of patients, which is consistent with our findings [32]. This may be due to the fact that breast-conserving surgery does not impact patients much regarding the physical appearance, which enables them quickly to return to normal life and to experience low degree of psychological distress.

A study on the psychological distress of patients with a new diagnosis of breast cancer and another one on psychological distress of patients with first-time chemotherapy exhibited psychological scores of (4.47 ± 2.29) and (4.92 ± 2.23) , respectively [33, 34]. An overseas study reported a psychological distress score of (3.95 ± 2.57) in breast cancer patients [35]. The score by overseas study is slightly lower than that of the domestic study, which may result from the fact that their patients had been diagnosed within 5 years and already had a certain understanding of the disease. Studies have demonstrated that reducing patients' psychological distress can help to ameliorate their negative emotions, which makes them to cope with the treatment with a positive attitude. Studies have also shown that psychological distress is positively correlated with patients' anxiety, and the elimination of psychological distress was associated with the removal of negative emotions [12, 36]. Our data are in line with previous results that the degree of psychological distress is positively correlated with the anxiety score. Further use of stepwise care intervention has found that this method is beneficial to the elimination of patients' psychological distress and anxiety. Studies have revealed that the stepwise care is a new type of nursing model that increases the intensity of gradual intervention [37]. A domestic study reported that for patients with gynecological malignant tumors, stepwise psychological care can effectively ameliorate the psychological distress and improve patients' quality of life [38]. Our study suggests that stepwise psychological care can alleviate patients' psychological distress and anxiety.

The sample size in this study was small, thus, a multi-center research would be needed to expand the sample size in the future. Additionally, the factors that affect patients' psychological distress and the therapeutic value of stepwise psychological care also warrant future investigation.

In summary, young age, low monthly income, radical mastectomy, and no medical insurance are independent factors that affect the psychological distress of patients undergoing chemotherapy after breast cancer surgery. The use of stepwise psychological care can reduce patients' psychological distress and anxiety.

Disclosure of conflict of interest

None.

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